

1986
ANNUAL
TROPICAL
CYCLONE
REPORT



JOINT TYPHOON WARNING CENTER
GUAM, MARIANA ISLANDS

FRONT COVER: *In the foreground gray cyclonic spirals of stratocumulus, as seen from the 54th Weather Reconnaissance Squadron WC-130 aircraft, define the eye of Typhoon Carmen (15W). The brighter patches in the mid-ground of the picture are more reflective water droplet clouds in the eye wall, which contrast with the other darker cloud debris and cirrus aloft. The previous day Carmen (15W) passed just 50 nm (93 km) north of the island of Guam. At picture time, 042355Z October 1986, the aircraft reconnaissance mission (AF966 0715 CARMEN) located the eye over the Philippine Sea 375 nm (695 km) northwest of Guam (Photo courtesy of Detachment 3, 1st Weather Wing and photographer Susan K. Watters, Captain, USAF).*

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FOREWORD

The Annual Tropical Cyclone Report is prepared by the staff of the Joint Typhoon Warning Center (JTWC), a combined USAF/USN organization operating under the command of the Commanding Officer, U.S. Naval Oceanography Command Center/Joint Typhoon Warning Center, Guam. JTWC was established in April 1959 when USCINCPAC directed USCINCPACFLT to provide a single tropical cyclone warning center for the western North Pacific region. The operations of JTWC are guided by CINCPACINST 3140.1 (series).

The mission of the Joint Typhoon Warning Center is multi-faceted and includes:

1. Continuous monitoring of all tropical weather activity in the northern and southern hemispheres, from 180 degrees longitude westward to the east coast of Africa, and the prompt issuance of appropriate advisories and alerts when tropical cyclone development is anticipated.
2. Issuing warnings on all significant tropical cyclones in the above area of responsibility.
3. Determination of reconnaissance requirements for tropical cyclone surveillance and assignment of appropriate priorities.
4. Post-storm analysis of all significant tropical cyclones occurring within the western North Pacific and North Indian Oceans, which includes an in-depth analysis of tropical cyclones of note and all typhoons.
5. Cooperation with the Naval Environmental Prediction Research Facility, Monterey, California, on the operational evaluation of tropical cyclone models and forecast aids, and the development of new techniques to support operational forecast scenarios.

Satellite imagery used throughout this report represents data obtained by the tropical cyclone satellite surveillance network. The personnel of Detachment 1, 1WW, collocated with JTWC at Nimitz Hill, Guam, coordinate the satellite acquisitions and tropical cyclone surveillance with the following units:

Det 4, 20WS, Hickam AFB, Hawaii

Det 5, 20WS, Clark AB, RP

Det 8, 20WS, Kadena AB, Japan

Det 15, 30WS, Osan AB, Korea

Air Force Global Weather Central,
Offutt AFB, Nebraska

In addition, the Naval Oceanography Command Detachment, Diego Garcia, and DMSP equipped U.S. Navy aircraft carriers have been instrumental in providing vital satellite position fixes of tropical cyclones in the Indian Ocean.

Should JTWC become incapacitated, the Alternate Joint Typhoon Warning Center (AJTWC) located at the U.S. Naval Western Oceanography Center, Pearl Harbor, Hawaii, assumes warning responsibilities. Assistance in determining satellite reconnaissance requirements, and in obtaining the resultant data, is provided by Det 4, 20WS Hickam AFB, Hawaii.

Changes to this year's publication include: raw fix data files usually printed in Annex A, plus the raw warning, forecast and best track data, will be available, upon request (the requested data will be copied onto 5.25 inch "floppy" diskettes provided by the requestor); statistical verification for individual warnings for the North Indian Ocean and all warnings in the southern hemisphere are not provided; and, with reference to best track philosophy, a conscious effort has been made to extend the post-warning best tracks to provide better verification for the 48- and 72-hour forecasts (this has produced a larger sample and slightly higher errors for the extended forecasts).

A special thanks is extended to the men and women of: 27th Information Systems Squadron, Operating Location C, for their continuing support by providing high quality real-time satellite imagery; the Pacific Fleet Audio-Visual Center, Guam for their assistance in the reproduction of satellite and graphics data for this report; to the Navy Publications and Printing Service Branch Office, Guam; the Royal Observatory Hong Kong and Central Weather Bureau, Taiwan for radar scope photographs of tropical cyclones; Mr. Ron Miller of NEPRF, for his able assistance in data reduction, and Captain S. K. Watters (USAF) for the cover photograph.

Note: Appendix IV contains information on how to obtain past issues of the Annual Tropical Cyclone Report (titled Annual Typhoon Report prior to 1980).

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(02W) TY KEN	HEISHMAN - -	22	(15W) TY CARMEN	DREKSLER - -	94
(03W) STY LOLA	FATJO - - -	26	(16W) TS DOM	CROSBY - - -	98
(04W) TS MAC	BERRY - - -	36	(17W) TY ELLEN	FATJO - - -	100
(05W) TY NANCY	BERRY - - -	40	(18W) TY FORREST	CLARK - - -	104
(06W) TS OWEN	GATANIS - -	44	(19W) TS GEORGIA	BERRY - - -	110
(07W) STY PEGGY	GATANIS - -	46	(20W) TS HERBERT	GATANIS - -	114
(08W) TY ROGER	COLUMBUS - -	50	(21W) TS IDA	MUNDELL - -	116
(09W) TS SARAH	BERRY - - -	54	(22W) TY JOE	CROSBY - - -	120
(11E) TY GEORGETTE	FATJO - - -	58	(23W) STY KIM	DREKSLER - -	124
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CONTRACTIONS

ABS MAG	Absolute Magnitude	EL	Elongated
ACCRV	Accuracy	ELEV	Elevation
ACFT	Aircraft	EXP	Exposed
ADP	Automated Data Processing	FI	Forecast Intensity (Dvorak)
AFGWC	Air Force Global Weather Central	FLT	Flight
AIREP	Aircraft Weather Report(s) (Commercial and Military)	FNOC	Fleet Numerical Oceanography Center
ANT	Antenna	FT	Feet
ACR	Area of Responsibility	GMT	Greenwich Mean Time
APRNT	Apparent	GOES	Geostationary Operational Environmental Satellite
APT	Automatic Picture Transmission	HATTRACK	Hurricane and Typhoon Tracking Steering Program
ARWO	Aerial Reconnaissance Weather Officer	HGT	Height
ATT	Attenuated	HPAC	Mean of XTRP and CLIM Techniques (Half Persistence and Climatology)
AVG	Average	HR(S)	Hour(s)
AWN	Automated Weather Network	HVY	Heavy
BPAC	Blended Persistence and Climatology	ICAO	International Civil Aviation Organization
BRG	Bearing	INIT	Initial
BT LAT	Best Track Latitude	INJAH	North Indian Ocean Component
BT LON	Best Track Longitude	INST	Instruction
BT WN	Best Track Wind	IR	Infrared
ODO	Central Dense Overcast	KM	Kilometer(s)
CI	Cirriform Cloud or Cirrus also Current Intensity (Dvorak)	KT	Knot(s)
CINCPAC	Commander-in-Chief Pacific AF - Air Force, FLT - Fleet (Navy)	LLCC	Low-Level Circulation Center
CLD	Cloud	LVL	Level
CLIM	Climatology	M	Meter(s)
CLSD	Closed	M/S	Meter(s) per Second
CM	Centimeter	MAX	Maximum
CNTR	Center	MB	Millibar(s)
CPA	Closest Point to Approach	MET	Meteorological
CSC	Cloud System Center	MIN	Minimum
CYCLOPS	Tropical Cyclone Steering Program (HATTRACK and MOHATT)	MOHATT	Modified HATTRACK
DEG	Degree	MOVG	Moving
DIAM	Diameter	MSLP	Minimum Sea-level Pressure
DIR	Direction	MSN	Mission
D MSP	Defense Meteorological Satellite Program	NAV	Navigational
DST	Distance	NEDN	Naval Environmental Data Network
DTG	Date Time Group	NEDS	Naval Environmental Display Station

NEPRF	Naval Environmental Prediction Research Facility	TOM	Tropical Cyclone Model
NESDIS	National Environmental Satellite, Data, and Information Service	TD	Tropical Depression
NET	Near Equatorial Trough	TDO	Typhoon Duty Officer
NM	Nautical Mile(s)	TIROS	Television Infrared Observational Satellite
N/O	Not Observed	TPAC	Extrapolation and Climatology Blend
NOAA	National Oceanic and Atmospheric Administration	TS	Tropical Storm
NOCC	Naval Oceanography Command Center	TY	Typhoon
NOGAPS	Navy Operational Global Atmospheric Prediction System	TYAN	Typhoon Analog Program
NTCM	Nested Tropical Cyclone Model	TYPN	Western North Pacific Component (Revised) of TYAN
NWOC	Naval Western Oceanography Center	TUTT	Tropical Upper-Tropospheric Trough
NR	Number	ULAC	Upper-Level Anticyclone
NRL	Naval Research Laboratory	ULOC	Upper-Level Circulation Center
OBS	Observations	VEL	Velocity
OTCM	One Way (Interactive) Tropical Cyclone Model	VIS	Visual
PACOM	Pacific Command	VMNT	Vector Movement (ddff)
PCN	Position Code Number	WESTPAC	Western (North) Pacific
POS ER	Position Error	WMO	World Meteorology Organization
PSEL	Possible	WND	Wind
PTLY	Partly	WRNG(S)	Warning(s)
QUAD	Quadrant	WRS	Weather Reconnaissance Squadron
RADOB	Radar Observation	WW ER	Wind Warning Error
RECON	Reconnaissance	W#	Warning Number
RNG	Range	XTRP	Extrapolation
RT	Right	Z	Zulu Time (Greenwich Mean Time)
SAT	Satellite	24 ER	24-Hour (Position) Error
SFC	Surface	48 ER	48-Hour (Position) Error
SLP	Sea-Level Pressure	72 ER	72-Hour (Position) Error
SRP	Selective Reconnaissance Program	24 WE	24-Hour Wind (Warning) Error
STNRY	Stationary	48 WE	48-Hour Wind (Warning) Error
SST	Sea Surface Temperature	72 WE	72-Hour Wind (Warning) Error
ST	Subtropical		
STR	Subtropical Ridge		
STY	Super Typhoon		
TAPT	Typhoon Acceleration Prediction Technique		
TC	Tropical Cyclone		
TCARC	Tropical Cyclone Aircraft Reconnaissance Coordinator		
TCFA	Tropical Cyclone Formation Alert		